

What is claimed is:

1. A heat exchanger system for a go-kart, comprising:
a body defining an intake opening on a first end of the body, a portion having a cross-sectional area larger than an area of the intake opening such that the body defines an expansion chamber between the intake opening and the portion, wherein the first end of the plenum body is adapted to face toward the direction of travel of a go-kart; and
a heat exchanger positioned in proximity to the portion of the body such that the body channels air from the intake opening to the heat exchanger and wherein the velocity of air decreases as it approaches the heat exchanger while passing through the expansion chamber thereby decreasing velocity pressure of the air and increasing static pressure of the air, and wherein the air pressure at an entry to the heat exchanger resulting from the body is matched to a pressure loss of the heat exchanger by having a ratio of the cross-sectional area of the portion to the area of the intake substantially equal to 4.2.
2. The heat exchanger system of claim 1, wherein the body is a bare duct.
3. The heat exchanger system of claim 1, wherein the body includes vanes running between the intake opening and the portion.
4. The heat exchanger system of claim 1, further comprising a fan disposed within the body between the intake opening and the portion.
5. The heat exchanger system of claim 4, wherein the fan is adapted to be driven mechanically from an axle of the go-kart.
6. The heat exchanger system of claim 4, wherein the fan is driven by an electric motor.
7. The heat exchanger system of claim 1, wherein the heat exchanger system has a fin density of at least 17 fins per inch.

8. A heat exchanger system for a go-kart, comprising:
 - a body defining an intake opening on a first end of the body, a portion having a cross-sectional area larger than an area of the intake opening such that the body defines an expansion chamber between the intake opening and the portion, wherein the first end of the plenum body is adapted to face toward the direction of travel of a go-kart; and
 - a heat exchanger positioned in proximity to the portion of the body and adapted to be positioned where a freestream is present such that the body channels freestream air from the intake opening to the heat exchanger and wherein the velocity of air decreases as it approaches the heat exchanger while passing through the expansion chamber thereby decreasing velocity pressure of the air and increasing static pressure of the air, and wherein the static pressure at an entry to the heat exchanger resulting from the body is greater than a freestream static pressure.
9. The heat exchanger system of claim 8, wherein the body is a bare duct.
10. The heat exchanger system of claim 8, wherein the body includes vanes running between the intake opening and the portion.
11. The heat exchanger system of claim 8, further comprising a fan disposed within the body between the intake opening and the portion.
12. The heat exchanger system of claim 11, wherein the fan is adapted to be driven mechanically from an axle of the go-kart.
13. The heat exchanger system of claim 11, wherein the fan is driven by an electric motor.

14. The heat exchanger system of claim 8, wherein a ratio of the cross-sectional area of the portion to the area of the intake is substantially equal to 4.2.

15. A go-kart, comprising:

a frame;

four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;

a liquid-cooled engine mounted to the frame;

a drive linkage between the engine and at least one of the four wheels;

a heat exchanger in fluid communication with the liquid cooled engine; and

a plenum body positioned in proximity to the heat exchanger such that the plenum body channels air to the heat exchanger, the plenum body defining an intake opening on a first end of the plenum body and defining a portion having a cross-sectional area larger than an area of the intake opening such that the plenum body defines an expansion chamber between the intake opening and the portion, and wherein the velocity of air decreases as it approaches the heat exchanger while passing through the expansion chamber thereby decreasing velocity pressure of the air and increasing static pressure of the air, and wherein the air pressure at an entry to the heat exchanger resulting from the body is matched to a pressure loss of the heat exchanger by having a ratio of the cross-sectional area of the portion to the area of the intake substantially equal to 4.2.

16. A go-kart, comprising:
- a frame;
 - four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;
 - a liquid-cooled engine mounted to the frame;
 - a drive linkage between the engine and at least one of the four wheels;
 - a heat exchanger in fluid communication with the liquid cooled engine and being positioned in a freestream location; and
 - a plenum body positioned in proximity to the heat exchanger such that the plenum body channels freestream air to the heat exchanger, the plenum body defining an intake opening on a first end of the plenum body and defining a portion having a cross-sectional area larger than an area of the intake opening such that the plenum body defines an expansion chamber between the intake opening and the portion, and wherein the velocity of air decreases as it approaches the heat exchanger while passing through the expansion chamber thereby decreasing velocity pressure of the air and increasing static pressure of the air, and wherein the static pressure at an entry to the heat exchanger resulting from the body is greater than a freestream static pressure.

17. A go-kart, comprising:
 - a frame including a steering wheel support;
 - four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;
 - a liquid-cooled engine mounted to the frame;
 - a drive linkage between the engine and at least one of the four wheels;
 - a heat exchanger in fluid communication with the liquid cooled engine, the heat exchanger being mounted rigidly with respect to the frame at the steering wheel support;
 - and
 - a plenum positioned in proximity to and on a direction of travel side of the heat exchanger such that the plenum channels air to the heat exchanger, the plenum defining an intake opening on a first side of the plenum body and defining a portion having a cross-sectional area larger than an area of the intake opening such that the plenum body defines an expansion chamber between the intake opening and the portion.
18. The go-kart of claim 17, wherein the plenum in combination with a driver forms a shape to achieve a substantially laminar flow of air around the shape.
19. The go-kart of claim 17, further comprising a fan disposed within the plenum between the intake opening and the portion.

20. A go-kart, comprising:
- a frame including a side-mounted heat exchanger support;
 - four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;
 - a liquid-cooled engine mounted to the frame;
 - a drive linkage between the engine and at least one of the four wheels;
 - a heat exchanger in fluid communication with the liquid cooled engine, the heat exchanger being mounted to the frame at the side-mounted heat exchanger support; and
 - a plenum body positioned in proximity to and on the front side of the heat exchanger such that the plenum channels air to the heat exchanger, the plenum defining an intake opening on a first end of the plenum body and defining a portion having a cross-sectional area larger than an area of the intake opening such that the plenum body defines an expansion chamber between the intake opening and the portion.
21. The go-kart of claim 20, further comprising a fan disposed within the plenum between the intake opening and the portion.
22. The go-kart of claim 20, further comprising a plenum body portion positioned in proximity to and on the rear side of the heat exchanger such that the plenum body portion channels air away from the heat exchanger, the plenum body portion defining a portion and an exit opening with the portion having a cross-sectional area larger than an area of the exit opening.

23. A go-kart, comprising:
a frame including a seat and a heat exchanger support behind the seat;
four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;
a liquid-cooled engine mounted to the frame;
a drive linkage between the engine and at least one of the four wheels;
a heat exchanger in fluid communication with the liquid cooled engine, the heat exchanger being mounted to the frame at the heat exchanger support; and
a plenum system positioned in proximity to the heat exchanger and including a front-side plenum portion that channels air to the heat exchanger and including a rear-side plenum portion that channels air away from the heat exchanger.
24. The go-kart of claim 23, wherein the front-side plenum portion defines an intake opening and defines a portion having a cross-sectional area larger than an area of the intake opening such that the front side plenum defines an expansion chamber between the intake opening and the portion and wherein the heat exchanger is located in proximity to the portion.
25. The go-kart of claim 23, wherein the rear-side plenum defines a portion and defines an exit opening having an area smaller than a cross-sectional area of the portion such that the rear-side plenum in combination with a driver defines a shape to achieve a substantially laminar flow of air around the shape and wherein the heat exchanger is located in proximity to the portion.
26. The go-kart of claim 23, wherein the front-side plenum portion includes a fan.
27. The go-kart of claim 26, wherein the fan is driven from the drive linkage to increase the velocity of the air passing through the plenum system toward the heat exchanger.

28. The go-kart of claim 23, wherein the rear-side plenum provides an exit at an area proximate to the rear under-side of the frame.

29. A go-kart, comprising:
- a frame including a seat and a heat exchanger support;
 - four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;
 - a liquid-cooled engine mounted to the frame;
 - a drive linkage between the engine and at least one of the four wheels;
 - a heat exchanger in fluid communication with the liquid cooled engine, the heat exchanger being mounted to the frame at the heat exchanger support; and
 - a plenum system positioned in proximity to the heat exchanger and including a plenum that channels air to the heat exchanger, wherein the plenum system further includes a fan within the plenum that increases the velocity air pressure of the air channeled to the heat exchanger.
30. The go-kart of claim 29, wherein the fan is a centrifugal driven from the drive linkage.
31. The go-kart of claim 29, wherein the heat exchanger support is located behind the seat.

32. A heat exchanger system for a go-kart, comprising:
a body defining an intake opening on a first end of the body, a portion having a cross-sectional area larger than an area of the intake opening such that the body defines an expansion chamber between the intake opening and the portion, wherein the first end of the plenum body is adapted to face toward the direction of travel of a go-kart; and
a heat exchanger having a fin density of at least 17 fins per inch and being positioned in proximity to the portion of the body such that the body channels air from the intake opening to the heat exchanger and wherein the velocity of air decreases as it approaches the heat exchanger while passing through the expansion chamber thereby decreasing velocity pressure of the air and increasing static pressure of the air such that airflow is maintained through the heat exchanger.
33. The heat exchanger system of claim 32, wherein the body is a bare duct.
34. The heat exchanger system of claim 32, wherein the body includes vanes running between the intake opening and the portion.
35. The heat exchanger system of claim 32, further comprising a fan disposed within the body between the intake opening and the portion.
36. The heat exchanger system of claim 35, wherein the fan is adapted to be driven mechanically from an axle of the go-kart.
37. The heat exchanger system of claim 35, wherein the fan is driven by an electric motor.
38. The heat exchanger system of claim 32, wherein a ratio of the cross-sectional area of the portion to the area of the intake is substantially equal to 4.2.

39. A go-kart, comprising:
- a frame;
 - four wheels coupled directly to the frame such that the four wheels are rigid with the frame but rotate relative to the frame;
 - a liquid-cooled engine mounted to the frame;
 - a drive linkage between the engine and at least one of the four wheels;
 - a heat exchanger in fluid communication with the liquid cooled engine and having a fin density of at least 17 fins per inch; and
 - a plenum body positioned in proximity to the heat exchanger such that the plenum body channels air to the heat exchanger, the plenum body defining an intake opening on a first end of the plenum body and defining a portion having a cross-sectional area larger than an area of the intake opening such that the plenum body defines an expansion chamber between the intake opening and the portion, and wherein the velocity of air decreases as it approaches the heat exchanger while passing through the expansion chamber thereby decreasing velocity pressure of the air and increasing static pressure of the air such that airflow is maintained through fins of the heat exchanger.